

# Neglected role of hookah and opium in gastric carcinogenesis: A cohort study on risk factors and attributable fractions

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A recent study showed an association between hookah/opium use and gastric cancer but no study has investigated the relationship with gastric precancerous lesions. We examined the association between hookah/opium and gastric precancerous lesions and subsequent gastric cancer. In a population-based cohort study, 928 randomly selected, healthy, *Helicobacter pylori*-infected subjects in Ardabil Province, Iran, were followed for 10 years. The association between baseline precancerous lesions and lifestyle risk factors (including hookah/opium) was analyzed using logistic regression and presented as odds ratios (ORs) and 95% confidence intervals (CIs). We also calculated hazard ratios (HRs) and 95% CIs for the associations of lifestyle risk factors and endoscopic and histological parameters with incident gastric cancers using Cox regression models. Additionally, the proportion of cancers attributable to modifiable risk factors was calculated. During 9,096 person-years of follow-up, 36 new cases of gastric cancer were observed (incidence rate: 3.96/1,000 persons-years). Opium consumption was strongly associated with baseline antral (OR: 3.2; 95% CI: 1.2–9.1) and body intestinal metaplasia (OR: 7.3; 95% CI: 2.5–21.5). Opium (HR: 3.2; 95% CI: 1.4–7.7), hookah (HR: 3.4; 95% CI: 1.7–7.1) and cigarette use (HR: 3.2; 95% CI: 1.4–7.5), as well as high salt intake, family history of gastric cancer, gastric ulcer and histological atrophic gastritis and intestinal metaplasia of body were associated with higher risk of gastric cancer. The fraction of cancers attributable jointly to high salt, low fruit intake, smoking (including hookah) and opium was 93% (95% CI: 83–98). Hookah and opium use are risk factors for gastric cancer as well as for precancerous lesions. Hookah, opium, cigarette and high salt intake are important modifiable risk factors in this high-incidence gastric cancer area.

**Key words:** gastric cancer, precancerous lesions, *Helicobacter pylori*, smoking, hookah, opium

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Gastric cancer holds a special place among worldwide malignancies in terms of both mortality and incidence. It constitutes the fourth common cause of cancer incidence and the second cause of cancer-related death.<sup>1,2</sup> Gastric cancer is the first and third most common cancer in Iranian men and women, respectively.<sup>3,4</sup> Ardabil province, located to the west of the Caspian Sea littoral, has one of the highest worldwide incidence rates of gastric cancer and a rising trend compared to previous reports.<sup>3–7</sup>

The classic pathogenesis of noncardia, and a group of cardia, cancers follows a slow progression from chronic gastritis through atrophic gastritis and intestinal metaplasia to dysplasia and eventually, adenocarcinoma.<sup>8</sup> Although *Helicobacter pylori* (*H. pylori*) is essential for initiation of the cascade,<sup>9</sup> remarkable geographical variations in gastric cancer incidence suggest a potential role for other lifestyle and genetic risk factors in the course of this malignancy.<sup>2</sup> Current knowledge on lifestyle and dietary factors of gastric cancer leaves no doubt about the role